Cloquet (Jul.)

MANUAL

OF

DESCRIPTIVE ANATOMY

OF THE

HUMAN BODY,

ILLUSTRATED BY TWO HUNDRED AND FORTY LITHOGRAPHIC PLATES;

BY JULES CLOQUET, M.D.

ASSISTANT SURGEON TO THE HOSPITAL OF ST. LOUIS, ASSOCIATE PROFESSOR OF THE FACULTY OF MEDICINE OF PARIS, MEMBER OF THE ROYAL ACADEMY OF MEDICINE, OF THE PHILOMATHIC SOCIETY, OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, OF THE LYCEUM OF NATURAL HISTORY OF NEW-YORK, OF THE MEDICAL SOCIETY OF LEXINGTON, KY. OF THE MEDICO-CHIRURGICAL SOCIETY OF BERLIN, &c.

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PUBLISHED BY W. & J. PENDLETON, GRAPHIC COURT,

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GENERAL OBSERVATIONS ON THE STRUCTURE OF THE HUMAN BODY.

The object of human anatomy, is the exact knowledge of all the organs composing the body of man. The analytic method should invariably be employed in the study of this science, to separate, divide and insulate parts by dissection, in order to know them thoroughly, become able to embrace the whole at one view, and the connexions by which they are held together.

In the human body, we must consider the *fluids*, *solids*, and *phenomena of life*, which have the most intimate relation with each other. The fluids during life are continually becoming solids, and the solids, in turn, revert to the fluid state. Both are only produced in living bodies, and life cannot exist except in beings formed at once of these organic elements.

The *fluids* or *humours*, form the greatest part of the body, about eighteen twentieths ; they are of three kinds : 1st, the blood ; 2d, the fluids poured into and mingled with the blood, for its renewal : 3d, those which emanate from the blood, the uses of which are very different according to their nature.

1st. The blood is the centre of all fluids, of those which renew it and of those for which it at all times furnishes the materials. It is a red, odorous, saline-tasted fluid, glutinous to the touch, slightly heavier than water. Its quantity has been differently estimated ; (from ten to a hundred pounds.) When recently drawn from a living man, it presents the following appearances : it exhales an animal vapour, and after being cooled some degrees, it forms a mass called *clot* or coagulum This successively contracts, and is soon surrounded by a yellowish whey like fluid, called *serum*, which separates from it by a sort of exudation. If the coagulum be washed, the water carries off the *cruor* or red colouring matter, and the residue is a fibrinous mass. The *serum* is formed in great part of water, albumen, some salts, and a small quantity of mucus. The *cruor* is composed of microscopic globules, surrounded by a colouring substance, of animal nature. The serum also contains globules, but much smaller than

those of the cruor. The fibrin, which during the fluidity of the blood was also fluid, consists of a collection of filaments united together like felt. It appears moreover, that the blood contains a small quantity of matter characteristic of the nervous substance, which CHEVREUL calls *cerebrine :* like all the other animal fluids it contains various salts.

2d. The liquid substances that mingle with and renew the blood enter especially by the digestive organs. The elements are transformed in the stomach into *chyme*, a homogeneous pultaceous, grayish, albuminous substance, in which we already find some globules analogous to those of the blood, excepting their colour. In passing through the small intestines, the chyme is changed in part into *chyle* a white opaque, inodorous sweet-tasted fluid, which coagulates when removed from the vessels, and whose coagulum, of a rose colour, contracts, and is at length surrounded by a fluid somewhat analogous to the serum of blood. The globules of chyle are numerous and do not differ from those of the blood, except by their whiteness, or by a pale rose-coloured tint. The coagulum of chyle appears to be intermediate to fibrin and albumen. There is also a fatty matter in chyle. This fluid successively acquires the properties of blood in the mesenteric glands, and especially in traversing the lungs, where it obtains the red colour at the same time that the venous blood undergoes a similar change.

3d. The blood, like a copious fountain, continually furnishes the materials of the *secreted fluids*, by means of the numerous canals which convey it to all parts. Some of these are rejected as excrementitious, such as urine, perspiration, &c. Sometimes they serve some purpose after their formation, as the milk, saliva, tears, bile, sperm, &c. The blood also conveys the materials for the nutrition, and increase of all the organs.

We might consider among the fluids, the gaseous substances found in certain cavities, as of the lungs, intestines, &c.

The SOLIDS, however numerous and various they appear, may be reduced to a certain number of *textures*, which are themselves susceptible of reduction by mechanical analysis to *microscopic globules*, united in series under the form of delicate filaments which are called *fibres*.— These fibres and globules form the base, or organic element of all our textures : they may be referred to certain primitive types of which the principal are, 1st. The *albugineous fibre* :— This is white, sometimes pearly and resplendent, linear, tenacious, elastic and slightly extensible : essentially formed of gelatin and albumen, it enters into the composition of the cellular and fibrous textures, &c. 2d. The *muscular, moving* or *fleshy* fibre. This is linear, flattened, soft, downy, white or red, according to the organs and animals During life it is endowed with the faculty of contracting or shortening itself. It is composed of a great quantity of fibrin and a small amount of albumen and gelatin. 2d. The *nervous substance*, which is a white or grayish pulp, soft, and inelastic, which takes different forms to constitute the nervous system. It is composed especially of two fatty matters, the one white, the other reddish, of osmazome, albumen, phosphorus, sulphur and some salts. 4th. The *glandulous substance* :—This is granulated, varying in colour, consistence and chemical composition, according to the glands into whose structure it enters.

The solids sometimes form cords, canals or vessels ; sometimes organized tissues which are called *membranes*, the texture and dispositions of which are as variable, as their uses.

The following are the principal *textures or systems*, which by their union compose the organs ; we merely indicate those to which we shall hereafter have occasion to return.*

1st. Cellular or Laminous System :—This is the most general in the animal economy. It is interposed to all other parts, and serves at once as a mean of union and separation ; through its intermediation a great number of our organs are susceptible of continual changes of form, relations, dimensions, and of the power of moving easily upon each other. It is throughout continuous, a species of net which penetrates every where : so that if we imagine all other parts removed, the body would still preserve its forms. Its continuity establishes communications between the most distant regions of the body : of itself it composes a great number of organs, and enters as an essential element into the formation of all the rest. In different individuals and in different parts of the body, there are sufficiently marked varieties in its consistence and texture. The substance composing it is extensible, tenacious, and retractile ; it readily assumes when stretched, the appearance of very thin and diaphanous layers ; when inflated, that of vesicles or transparent cells, all communicating with each other. It serves as a mould to all other parts, the smallest integrant particles of which are plunged in its thickness ; it is a sort of atmosphere surrounding and penetrating them. During life it is continually moistened or bedewed with a serous vapour which is poured into its areola by capillary vessels ramifying thereupon, and this vapour is again taken up by absorbents originating from the same surfaces. Examined with the microscope, the cellular texture appears composed of rounded globules, united according to the researches of Edwards, in irregular series, which sometimes form straight, and sometimes waving or curved lines, disposed in layers ; the same author has determined that all the globules of a layer of cellular substance are alike, and that their actual diameter is $\frac{1}{300}$th of a millimetre.† The chemical composition of the cellular texture, approaches that of the serum of the blood : it is formed especially of albumen and gelatin.

2d. Adipose System :—This consists of membranous vesicles united in groups, varying in bulk, lodged most frequently in the areola of cellular texture, and containing in their cavity a yellowish fluid of a peculiar taste and smell, called *fat*.‡ Adipose vesicles are generally rounded, globulous, and often sustained by a vascular pedicle. Internally they present very delicate filaments, which traverse them, like incomplete partitions, and are furnished with capillary blood vessels. The adipose texture forms an even layer under the skin, which fills up the inequalities of other parts, and gives the graceful and rounded outline to the female and infant. Its quantity averages about the twentieth part of the entire weight of the body. In youth it abounds principally under the skin ; in middle age it successively abandons this place, being concentrated in the cavities of the trunk : in old age, its quantity ordinarily diminishes, and the individuals emaciate. The marrow which fills the cavities of the bones is of the same nature as the fat of other parts. The fat which distends the adipose vesicles is semi-fluid at the ordinary temperature of the body: its consistence however, varies slightly in the different regions.

3d. Vascular System.—This is formed by the *vessels* or canals in which the fluids are contained and circulated. Some of these vessels contain the blood ; these are the *arteries* and

* Pl. 1, fig. 2. † Pl. 1, fig. 3. ‡ Pl. 1, fig. 1, 2.

veins: others contain the lymph and chyle; these are the lymphatic or chyliferous vessels. The vascular system is composed of the three following secondary systems:

A. Arterial System.* In man the arteries, two in number, have their trunks to arise from the ventricles of the heart, and ramify, one (the *aorta*) throughout all parts of the body, the other (the *pulmonary artery*) through the lungs alone. Each of these have an arborescent form, the trunks giving origin to secondary trunks, these to branches, the latter to twigs, the twigs to ramuscles still decreasing in size. Each division of the arteries is sensibly cylindrical. The walls of these vessels are formed by an *internal membrane*, which is delicate, smooth and fragile; a *middle* membrane, which is thick and resisting, having yellowish elastic circular fibres; and of a strong, *external membrane*, having close felt-like fibres, analagous in nature to the ligamentous texture. Both of the great arteries are provided at their origin with three valves which permit the blood to pass from the heart into their cavity, and which oppose the retrograde course of that fluid: at their peripheral extremities they become of a capillary tenuity, and communicate, more or less, manifestly with the veins, according to the parts. It appears also that they have *exhalent extremities* or *porosities*† They conduct the blood by a sort of centrifugal movement from the heart to all parts of the body.

B. Venous System.—The *veins* arise by a multitude of capillary roots in all the organs of the body, and in the lungs. They terminate in the auricles of the heart:‡ those which come from all parts (*vena cavæ*) by two trunks, and those of the lungs (*venæ pulmonales*) by four. The veins are divided and subdivided much like the arteries; their interior is provided with a great number of valvules, generally arranged in pairs, forming actual valves which permit the blood to pass from the branches into the trunks and prevent its reflux, in the opposite direction. The coats of the veins are much more delicate and softer than the arteries, being formed of two membranes. The veins are larger and more numerous than the arteries.—They bring back the blood from all part, whence the fluid circulates in them from the lungs to the branches, and from these to the trunks, manifesting a truly centripetal motion.

C. Lymphatic System.‖—The *Lymphatic*, or *absorbent* vessels generally distributed throughout the body, have very delicate and semi-transparent coats; they are all internally provided with valvules, similar to those of the veins, and having the same uses. Thus, externally viewed, they present strangulations at different intervals on a level with the valvules. Of these vessels, one set contains a limpid fluid called *lymph;* the others are filled at certain lines with chyle, which they suck up from the internal surface of the intestines. The lymphatic vessels unite in several trunks which open into the veins to discharge their contained fluids, and mingle them with the blood. But before entering the veins they all traverse, being first subdivided, organs called *lymphatic ganglions*. These are small reddish bodies, variable in size and volume, and of a texture still but little known. After having ramified in their thickness, the lymphatic vessels come out to discharge themselves into the principal trunks.

* Pl. 1 fig. 4. † pl. 1, fig. 6. ‡ pl. 1. fig. 5, 7. ‖ pl. 1 fig 8.

4th Nervous System.—This is formed by a soft pulpy substance composed of white or grayish globules, disposed in various manners. This matter is either arranged in masses of variable size, of a determined form, as may be observed in the brain, cerebellum, and spinal marrow, or it is enclosed in very fine fibrous canals, fasciculated, to form the *nerves*,* or soft whitish cords, which divide into a great number of branches, and convey sensation and motion through all parts. These nerves in certain places unite together to form networks, to which the name of *nervous plexus* has been given. In other cases, the nervous substance is re-united by cellular texture into small grayish dense masses, into which a great number of nervous filaments enter, and others emanate therefrom. These little masses are called *nervous ganglions*.† The nervous substance is in some parts expanded in form of a soft diffluent membrane, as in the retina, &c.

The different organs constituting the nervous substance, forms two distinct, principal systems ; one belonging most especially to sense and motion, the other to the organs of nutritive life.

5. Serous System.—The serous membranes constituting this system are species of sacs without opening, placed wherever great movements occur. They appear to be nothing more than a particular form of cellular texture. They are found under the skin, where that membrane covers very moveable bones, as in front of the knee, elbow, &c. around or at the sides of the tendons and aponeuroses of the muscles which produce great movements ; between the articulations of moveable bones; in short, through all the cavities of the trunk. They have every where the appearance of closed sacs attached by one surface to the moveable part, and by the other to those against which they move. They are folded upon themselves to furnish more or less complete sheaths to the vessels, nerves, and other parts, which traverse them, so that the organs are not within their cavity, as at first sight they appear to be. Their internal surfaces are smooth, polished and free. They are formed of condensed cellular texture, and traversed by a great number of lymphatics and blood vessels.‡ They are furnished with fringed processes which pour out internally an albuminous, limpid, unctuous, cohesive fluid, which facilitates the sliding of contiguous parts on each other, and consequently that of the organs to which they are attached. This fluid is incessantly discharged from the extremities of the exhalent arteries, and taken up again by the absorbent vessels. The serous membranes, thus represent great reservoirs intermediate to the exhalent and absorbent vessels, in which the serous fluids, in coming out of one set, are for some time delayed before passing into the other.

6. Mucous System.—The mucous membranes composing this system, have been thus named on account of the viscous liquid which habitually lubricates their free surfaces They line the ducts, cavities, and hollow organs which communicate with the exterior by the natural openings by which the skin is pierced, and are continuous with the integuments adjoining the circumference of these openings. They consequently present an external or adherent surface, and a free internal surface. These membranes may be referred to two great divisions ;

* Pl. 1, fig 11. † Pl. 1, fig. 12. ‡ Pl. 1, fig. 9. || Pl. 1, fig. 10.

one called *gastro-pulmonary*, lines the interior of the organs of digestion and respiration; the other called *genito-urinary*, clothes the interior of the organs of generation and excretion of urine. These membranes, in general, are every where in contact with substances foreign to the body: they represent an internal skin, and have striking resemblances of organization, functions and vital properties to the cutaneous texture. They are composed of a chorion or fibrous web, forming the principal part—of papillæ, and in the vicinity of external openings of an epidermis which protects them. The last is replaced by an abundant mucous in deep seated organs They receive numerous blood-vessels, lymphatics and nerves, and in almost all parts they are studded with small rounded grayish glands, which are called *mucous follicles*.† These have in their centre a cavity which opens by a narrow orifice on the free surface of the membrane to pour out the transparent viscous, tenacious, fluid, designated by the term *mucus*.

7. Ligamentous System. This is composed of slightly extensible albuginous fibres which form by their union cords, bands, or species of whitish, shining satin-like tissues. The ligamentous texture, especially remarkable by its degree of cohesiveness and resistance of rupture, appears to differ from the cellular texture solely by its condensation; like the latter texture, it is gelatinous and albuminous. It forms 1st the *ligaments* which attach the bones to each other*: 2d, the tendons or fibrous cords attached to the bones, through which the muscles, whose fleshy fibres are received at their extremities, cause the motions of the bones; 3d. the *aponeuroses* or membranes surrounding the muscles, and serving as points of attachment to their fibres, and are often themselves but mere expansions of tendons;† 4th. many other membranes, which envelope different organs, enter into their composition, as the dura mater periosteum sclerotica, &c. The ligamentous texture is almost entirely composed of gelatine.

8. Elastic System. The fibres forming this system are distinguished from the preceding texture, by less resistance, much more elasticity, and a peculiar yellowish colour. In chemical character it differs, in being of an albuminous and fibrinous nature. This texture is employed by nature in antagonizing gravitation and muscular contraction. In large quadrupeds, it constitutes an elastic ligament, which sustains the head without the aid of muscular action.—The arteries have in their thickness an elastic membrane of this texture, which compresses the blood that the contraction of the heart has sent into the vessels and thus aids in continuing the circulation. We find the elastic tissue, also, in many of the vessels; in certain ligaments of the vertebral column, the air-tubes of the lungs, &c.

9. Cartilaginous System. *Cartilages* are parts of an opaline, milky whiteness. They are flexible, compressible, very elastic, resisting—softer, however, and lighter than the bones. The disposition of their fibres is not seen without much difficulty on account of their compactness, which gives them the appearance of being homogeneous, like the coagulated white of egg. Cellular substance appears to enter, but in very small quantity into their organization. In the ordinary condition their vessels contain only colourless fluids; neither nerves nor lym-

* Pl. 1, fig. 10. † pl. 2, fig. 3. ‡ pl. 2. fig. 1. ‖ pl. 2, fig. 7. § pl. 2, fig. 5, 6, 8.

phatics have yet been demonstrated in cartilage. The cartilaginous system is composed of albumen, water, and phosphate of lime. Some cartilages form the parenchyma of bones, before the entire developement of ossification, and have been called *temporary*, or *cartilages of ossification ;** others cover the articular extremities of bones, and have been named *incrusting cartilages ;* those which serve to elongate certain bones, as the ribs, have been styled *cartilages* of *prolongation*, &c. These organs perform very important functions in the animal economy, on account of their consistence and perfect elasticity.

10. Fibro-cartilaginous System. This is formed by the *fibro-cartilages*. Organs are thus named which have a texture intermediate to the fibrous and cartilaginous textures.† Beclard has distinguished them as, 1st. Temporary fibro-cartilages, or of ossification ; such as in the fœtus form the patella and other sesamoid bones , 2d. *Incrusting fibro-cartilages* ; these exist wherever there is a considerable friction of a bone, or of a tendon against the periosteum, as is seen in the sheaths giving passage to the tendons : 3d. Interarticular fibro-cartilages, found between the articular surfaces of bones.

11. Osseous System. The bones are the most solid, and hardest organs of the body which they sustain, of which they determine the principal forms and divisions.‡

12. Muscular System.‖ This is formed by the *muscles*. Organs very variable in size and figure, ordinarily of a red colour, capable of shortening or contracting to produce motions and forming what is commonly called the flesh of animals. Muscles communicate motion by being inserted into bones and other parts, most commonly by means of cords or membranous fibres. Sometimes they contract under the influence of the will ; sometimes their shortening occurs independently of this act of the understanding.

13. Erectile or cavernous system.—This is a texture of a peculiar spongy nature, composed of small filaments which cross, unite and separate in all directions, forming a vast number of areolæ communicating with each other, and ordinarily filled with or soaked in blood.§ The cavernous texture appears to be essentially nervous and muscular. It enlarges, becomes distended, reddened, and erected under the stimulus of different agents, thus causing movements, in consequence of the active dilatation of which it becomes the seat. It is found in the penis, clitoris, nipple, &c.

14. Glandulous system.**—This is constituted by the *glands;* organs which are very different in size and figure, having, in general a soft globulous, granular texture, in which we find a great number of vessels, nerves, and a peculiar tissue. The intimate nature of the glandulous texture is still unknown ; it appears to differ in each gland. Some have thought with Malpighi, that it results from an agglomeration of small solid masses called *glandular grains*, in which the blood-vessels and nerves terminate, and whence arise the *excretory ducts*. Others have believed with Ruysch, that the glandulous texture is entirely vascular : finally, some have imagined that the glandulous grains of Malpighi, were nothing but species of little sacs or follicles in which fluids were delayed to acquire peculiar characters during their stay. A multitude of small ducts come out of the glands which unite to form trunks of different sizes,

* Pl 2, fig. 5, 6, 8. † pl. 2, fig. 9. ‡ pl. 2. fig. 4, 5, 6. ‖ pl. 2. fig. 1. § Pl. 2 fig. 10. ** pl. 2, fig. 2.

giving origin to one or more excretory ducts, to carry off the secreted fluids. The glands, in fact, such as the liver, pancreas, kidneys, breast, testicles, &c. are destined to draw from the vessels the molecules necessary to the formation of numerous fluids, as the bile, pancreatic fluid, urine, milk, sperm, &c elaborated in their texture under the influence of the vital forces. Many of these glands have in the course of their excretory ducts, particular reservoirs, in which the secreted fluids are amassed, and undergo different modifications before they are finally evacuated.

15. Corneous System.—This comprises parts, in the interior of which the presence of vessels and nerves cannot be demonstrated, which are insensible, capable of re-production when they have been destroyed or spontaneously removed, and appear to result from the concretion of a matter secreted by the organs upon which they are found * This system comprises the epidermis, nails, hair—and in animals, the horns, scales, feathers, &c.

The textures form, alone, or differently combined with each other, all the organs of the body. These, connected with each other to discharge the functions of life, of which they are but the material instruments, are united in different groupes, more or less complicated, designated by the name of *apparatus*. These groupes have been divided according to the functions they perform. Thus, by following in the study of anatomy, this physiological order, the only one that should be adopted, we see that the *apparatuses* may be referred to three *principal classes*, according as they have for object, 1st, to place the individual in relation with external objects; 2d, to contribute to nutrition, support and growth; and 3d, to serve for the propagation and generation of the species.

In conformity with this order, and not to separate too far from the ancient method, still followed by a considerable number of anatomists, we divide our work into seven great parts, viz: 1st. osteology, or of the bones and their means of union, 2d. myology, or of muscles and their dependencies; 3d. of the organs of sense; 4th. neurology, or of the nerves, 5th. angeiology, or of the vessels; 6th splanchnology, or of the viscera, 7th, embryology, or of the fœtus and its dependencies.

To study the organs and determine their general positions and respective relations, we suppose the man erect, in a perfectly vertical situation, the arms pendant from the sides of the trunk, and the palms of the hands directed forwards. We draw an imaginary line, which passing from the summit of the head, falls vertically between the feet, and makes of all parts a right angle with the ground; this is called the *median line* of the body. We employ this line in assigning the names of region to organs, and according as they appear in relation to this axis of the body, they are *anterior* or *posterior*, *internal* or *external*, *superior* or *inferior*, *middle* or *lateral*, &c.

* Pl. 2, fig. 11.

FIRST PART.

OSTEOLOGY.

That part of anatomy is thus named, which treats ofthe bones, and their dependencies, or the organs which serve for their articulations.

OF BONES IN GENERAL.

The bones form the most solid and resisting part of the body, of which they constitute the frame work. They are inflexible and break easily, with a snap. Their colour is reddish when they are recent, and perfectly white when they have been prepared by maceration. Externally they are covered by a membrane called *periosteum*. They contain in their cavities and texture a fluid fat, called *marrow*.

The PERIOSTEUM is a very dense, semi-transparent fibrous membrane, which immediately envelopes the bones throughout the greatest part of their extent. It does not exist at the level of their articular surfaces, and is manifestly continuous with the fibrous organs which are inserted into it. It contains a great number of blood vessels which run into, and nourish, the substance of the bone. A fibrous membrane, similar to the periosteum, is also remarked upon certain cartilages ; it has received the name of *perichondrium*.

The MARROW belongs to the adipose system ; it is a fat, yellowish, somewhat solid, granulated substance formed of small vesicles. It fills the central canals of long bones. In the extremities of these bones, and in the short bones, it is reddish, more fluid, and has been named *medullary* or *oily juice*. The marrow is contained in a special membrane, which is cellulous and vascular, lining the medullary cavity of long bones, and sending very fine expansions into the cellules of the spongy texture, where it manifestly exists. The central artery of long bones divides into two principal branches, one of which ascends and the other descends upon the parietes of the medullary canal to distribute their numerous ramifications upon its membrane.* This membrane represents a sort of internal periosteum, and nourishes the deepest seated laminæ of the bone, at the same time that it secretes the marrow.

The bones are nourished by the blood carried into them by the arteries, the residue of which is brought back by the accompanying veins. Lymphatic vessels have not yet been discovered in them. They receive nervous filaments from the great symphathetic, or ganglionic system. They are essentially formed of two substances, one is gelatinous organized parrenchyma ; the other a calcareous salt, which fills the areolæ of the parenchyma, and imparts to it solidity.

* Pl. 2, fig. 5, 6.

We prove the existence of these two principal elements in bone, 1st, by soaking them for some time in diluted hydrochloric (muriatic) acid, which takes up the calcareous salt, and leaves exposed a soft gelatinous, flexible parenchyma, having exactly the same form as that of the bone ; 2d, by boiling bones in Papin's digester, we obtain an inverse result ; the parenchyma is dissolved and remains in the fluid, and we obtain their *skeleton*, or calcareous substance, rendered very friable by parting with the gelatine. If bones be calcined, the gelatinous part is destroyed, and nothing but the earthy salts remain.

Gelatin and fat make up about half of the weight of bones, the other half is formed of inorganic substances, which according to the most recent analysis, are the phosphate of lime, composing the largest part, the carbonate of lime, the phosphate of magnesia, phosphate of ammonia ; oxydes of iron and manganese, united probably with the phosphoric acid ; some traces of alumine, silex and soda.

The osseous texture is composed of very solid fibres, identical in all the bones ; differently disposed in different regions : sometimes they have the appearance of layers varying in density, which surround the bones and line the openings they present ; frequently they are disposed in filaments, in numerous very delicate and areolar lamellæ running in a thousand different directions, and leave between them cellules of variable form and size, which all freely communicate with each other. This arrangement of osseous fibres has received the name of *spongy, cellular* or *reticular texture.** This spongy texture is especially observed in the interior of bones, and the compact texture on their exterior.

In relation to their Form, bones have been divided into *long*, *flat*, and short, according as the dimension in length or breadth predominates, or that these are equal to the thickness.

The Long bones are found in the limbs. They are larger and less numerous in proportion as they are near to the trunk. Their *extremities* are dilated as if swelled, their middle part, or *body*, is contracted, generally rounded or triangular, and often twisted upon itself—it has a central cavity which contains the marrow, and this is called the *medullary canal*. This canal renders the bone lighter and stronger, without augmenting the quantity of the substance which composes it ; the cavity enlarges with the age of the bone.† The bodies of long bones are formed of a layer of compact texture, which is very thick in the middle, and gradually thinner towards the extremities, to envelope the spongy texture which is there so abundant.

The *flat* or *broad* bones, commonly by their union, form the walls of certain cavities, as the skull and pelvis. They have two layers of compact texture, frequently with radiated fibres,‡ containing between them a variable quantity of spongy texture ; this last has received in the bones of the cranium the name of *diploe*.‖

The *short* bones are commonly very irregular not voluminous, and collected in great numbers in the regions they occupy. They are externally composed of a thin layer of compact texture, and internally of spongy substance.

On examining their *surfaces* the bones present a great number of eminences and cavities to which various names have been given.

* Pl. 2, fig 5, 6. † pl. 2 fig. 5, 6. ‡ pl 2. fig. 4. ‖ pl. 3, fig. 1, 2.

The *eminences* are termed *apophyses*. When they are separated from the principal part of the bone by a layer of cartilage, and their ossification is not completed, they are called *epiphyses*.*

The apophyses are divided into such as do, and such as do not serve for articulations.

1st. The *articular apophyses*, are called *heads*, when they are spheroidal ; *condyles* when they are broader in one direction than another ; and the contracted part which sustains them commonly receives the name of *neck*. When they serve for immoveable articulations, they are called *dentations*, *roots*, &c.

2d. The *inarticular apophyses* are for the most part destined for the insertion of fibrous organs, ligaments, tendons and aponeuroses : to the reflexions of some tendons, &c. They have been distinguished—

A. According to their general form—as *lines* ; unequal eminences, slightly salient and extended in length : *crests ;* projections similar to lines, but smooth and more marked : *processes ;* rounded, large and smooth apophyses ; *protuberances* and *tuberosities*, rounded and rugous eminences.

B. According to the bodies with which they are compared—as *spinous styloid*, *coracoid*, *odontoid*, *mastoid*, *apophyses*, &c. as they resemble a thorn, style, crows-beak, tooth or nipple.

C. According to their uses ; *trochanters*, or eminences serving for rotation : *orbitar* apophyses, pertaining to the orbit, &c.

D. According to their direction and situation ; hence *transverse*, *ascending*, *vertical superior*, apophyses, &c.

The cavities of bones, like their apophyses, are divided into *articular* and *inarticular*.

The *articular cavities* are called *cotyloid* when they are hemispherical and deep ; *glenoid*, when large and slightly concave ; *facettes* when nearly plane ; *alveoles*, when deep and conical.

The *inarticular* cavities are variously named, according to their form, uses, &c. *fosssa*, cavities whose entry is larger than the base : *sinus ;* cavities whose entrance is narrower than the base—*depressions*, broad shallow, rugous cavities ;—*fissures*, narrow, deep and long cavities ;—*grooves* narrow and long cavities lodging the arteries ;— *gutters*, elongated cavities, commonly receiving the veins ;—*hollows*, excavations made upon the edges of bones ; *holes* or *foramina ;* cavities which traverse different parts of thin bones :—*canals* which pass for some extent along the course of a bone.

Bones have numerous opening upon their sufaces, through which the vessels that nourish them pass. The long bones have in their body one principal nutritious canal, and at their extremities a multitude of other secondary foramina. The compact texture itself is riddled by pores which give passage to very delicate vessels. The broad and short bones have only the two last sorts of cavities of nutrition.

* Pl. 2, fig. 6.

DEVELOPEMENT OF BONES.

The bones are far from exhibiting the same structure at different periods of life. At the earliest, or immediately after conception, they are mucous, like all the other organs; they soon become cartilaginous; vessels are distributed in these cartilages which are at first white, then yellow, and finally red, when they receive the blood. It is only when the ossification properly so called commences, that the temporary cartilage of the bone disappears, to give place to the gelatinous parenchyma, and to the phosphate of lime. Certain bones are developed from but one point of ossification;* others by a great number† which are at first separate, and finally coalesce with each other at variable epochs, in each bone.‡

OF THE SKELETON.

The bones by their union constitute the skeleton, a sort of solid frame work to which the soft parts are attached and suspended. This aggregation of the osseous system serves for the support of other organs, determines the general form of the body, and the proportion of its different parts: It represents a series of levers, articulated and set in motion by muscles; or forms cavities destined to contain the organs most essential to life, and protect them from the action of external agents.

Where the bones are held together by the ligaments, their natural connexions, the skeleton is called *natural;* when on the contrary the bones are joined by foreign bodies, such as cords, wires, &c. the skeleton is *artificial.*

The skeleton presents differences, according as it pertains to a fœtus, child, adult, or old man; a male or female.

The bones of the skeleton vary in number, because many of them, as the *sesamoid bones* and those called *wormian* or triquetral, are not constant in their existence. However in the adult, generally, the number of bones amount to two hundred and forty.§

The skeleton is divided into several parts, which are the *trunk* and *members.*

The trunk is divided into one middle part and two extremities.

The superior extremity of the trunk, is formed by the *head* itself, divided into two parts, the *cranium* and *face.* The cranium is composed of the eight following bones: the *frontal,* (or *coronal,*) two *parepitals;* the *occipital,* two *temporal;* the *sphenoid* and *ethmoid* bones. To these some anatomists add the bones belonging to the organ of hearing contained in the temporal bones, and the *sphenoidal* cornua. [It has been clearly established by WISTAR, that these cornua belong to the *ethmoid* bone, and they are now distinguished by the name of *Wistar's Pyramids.*] See his anatomy, vol. 1, p. 31, ed. 3d.]

The face is divided into upper and lower jaw.

* pl. 2. fig. 4. † pl. 3, fig. 6. pl. 4. fig. 7.

‡ All the bones placed upon the median line of the skeleton are *single*, or are *symmetrical*, that is to say, we may divide them through their middle into two perfectly similar lateral portions: so that we need only study one of these portions to know the whole bone. The bones, on the contrary, which are placed on the lateral parts are in *pairs*, and are not *symmetrical*: in fact if they be cut in any direction, we can never separate them into two similar parts. Thus it is absolutely necessary to study them in all their parts. However, as those on the right side are similar to those on the left, it is sufficient to study them on one side.

MANUAL

OF

DESCRIPTIVE ANATOMY

OF THE

HUMAN BODY,

ILLUSTRATED BY TWO HUNDRED AND FORTY LITHOGRAPHIC PLATES;

BY JULES CLOQUET, M.D.

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TRANSLATED

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PUBLISHED BY W. & J. PENDLETON, GRAPHIC COURT,

BOSTON.

PRINTED AT THE RUTGERS PRESS,

BY WILLIAM A. MERCEIN,

NEW-YORK.

1827.

EXPLANATION

OF THE

PLATES.

MANUAL

OF

DESCRIPTIVE ANATOMY.

EXPLANATION OF THE PLATES.

PLATE 1.*

FIG. 1. Subcutaneous *cellular* and *adipose* texture, from the inguinal region of a young girl.

No. 1, 1. Section of the skin.—External surface of the skin, and hairs with which it is covered. 3, 3. Filaments and lamella of extreme tenuity, which cross each other in every way, leaving between them areolæ, constituting the *cellular* or *laminous texture*. The adipose vesicles which filled these areolæ, have been removed to expose the cellulous filaments. 4. The lamella or cellular texture, continuous with the deepest layers of the skin. 5, 5. Adipose texture formed by vesicles filled with fat, and plunged amidst the filaments of the laminous texture.

FIG. 2. *Adipose vesicles* separated and sustained by filaments of cellular texture uniting them.

No. 1, 1. Adipose vesicles.—2. Cellular filaments.

FIG. 3. Cellular texture seen through a microscope, enlarged three hundred times in diameter. According to EDWARDS, the apparent diameter of a globule is $\frac{1}{300}$th of a millimetre.†

FIG. 4. *Arterial System.*—The internal iliac artery, with the principal divisions and subdivisions insulated from the parts to which it is distributed.

No. 1. Trunk of the artery. 2. Branches arising from the trunk. 3. re-entering angle formed between the two preceding branches in separating.—4, 4, 4. Twigs,—5, 5, 5. *Arterial Ramuscles* —6, 6. *Capillary divisions*, or ultimate branches of the arteries. 7, 7, 7. Arrows, indicating, by their direction the course of the blood in the arteries in passing from the trunks to the branches, from these to the twigs, ramuscles and capillary texture.

* The greatest part of the plates in this work are drawn from anatomical preparations made by Mr. *Pailloux*, under the direction of Professor *Cloquet*.

† The *Metre* is equal to 39 37-100 English inches; It is divided into *Decimetre's*, or tenths, *Centimetre's* or hundreth's, and *Millimetres* or thousandth's

FIG. 5. *Venous system.*—External iliac vein with its principal divisions and subdivisions.—The trunk of the vein is opened in order to exhibit the interior of its walls and the arrangement of the valves.

No. 1. Trunk of the external iliac vein. 2, 2. Branches arising from the preceding vein. 3, 3, 3. Twigs—and 4, 4, venous ramuscles. 5, 5. Capillary divisions of the preceding veins. 6, 6, 6. Arrows, indicating the course of the blood in the veins in passing from the capillary divisions to the ramuscles, from the ramuscles to the twigs, from these to the branches, and hence to the trunks. 7. Cavity of the principal trunk of the vein. 8, 8. Openings by which the branches of the vein open into its cavity. 9, 9. Valves formed by the internal membrane of the vein.

FIG. 6. Portion of small intestine, seen on its external surface, having its arteries filled with red injection, to show the capillary arteries.

FIG. 7. Portion of small intestine, seen on its external surface having the veins filled with blue injection, to show the venous capillary vessels.

FIG. 8. *Lymphatic system.*—Lymphatic vessels and ganglions.

No. 1, 1, 1, 1. Lymphatic vessels. 2. Lymphatic ganglion. 3, 3. Different lymphatic vessels dividing to penetrate the ganglion. 4, 4. Different vessels coming out of the ganglion. 5, 5, 5, 5. Arrows indicating the course of the lymph in the preceding vessels.

FIG. 9. *Serous system.*—Portion of the peritoneum, (serous membrane) which internally covers the anterior wall of the abdomen on a level with the rectus muscle.

No. 1, 1, 1. Portion of the rectus abdominis muscle subjacent to the serous membrane. 2. Internal or free surface of the peritoneum. 3, 3. Capillary blood vessels ramifying in the thickness of the peritoneum. 4, 4. Portion of the skin.

FIG. 10. *Mucous system.*—Mucous membrane of the lips from a man twenty-two years old. The lower lip is everted and held by a hook. A portion of its mucous membrane is raised to show the subjacent mucous follicles.

No. 1. Mucous membrane of the upper lip. 2. Mucous membrane of the inner surface of the lower lip. 3. Mucous follicles exposed by raising the mucous membrane.

FIG. 11. *Nervous system.* Part of the nerves forming the brachial plexus and one of the branches arising therefrom.

No. 1, 1, 1, 1. Nervous trunks. 2, 2. Points where the preceding nerves unite to form the plexus. 2. Branch separating from one of the nerves of the plexus. 4. Nervous filaments arising from the preceding branch.

FIG. 12. *Nervous ganglion.*—Superior cervical ganglion, of the great ganglionic (commonly called sympathetic) system.

No. 1. Trunk of the nerve above the ganglion. 2. Same nerve below the ganglion. 3, 3, 3. Filaments going to the ganglion from the three first cervical

nerves. 4, 4, 4. Nervous filament coming out of the ganglion. 5. Nervous bands of the ganglion. 6. Anastomosis of nervous filaments in the ganglion. 7. Network formed by nervous filaments.

PLATE 2.

FIG. 1. *Muscular system.*—The inferior half of the biceps brachii flexor, and its aponeurotic expansion

No. 1. Body of the muscle. 2. Transverse section of its muscular fibres. 3. The muscular fibres terminating in 4. The tendon. 5. Aponeurotic expansion which arises from the preceding tendon.

FIG. 2. *Glandulous system.*—The sub-maxillary gland with its excretory duct.

No. 1, 1, 1. Lobes and lobules of the gland. 2. Excretory duct. 2, 2. Roots by which the excretory duct arises from the granulations of the gland.

FIG. 3. *Fibrous system* —The internal lateral and the annular ligament of the elbow joint.

No. 1. Inferior extremity of the humerus. 2. The olecranon. 3. Capsular ligament and anterior part of the articulation. 4. Insertion of the internal lateral ligament into the internal tuberosity of the humerus. 5, 5 Insertion of the same ligament into the ulna 6, Ulna—and 7, Radius, sawed transversely. 8. Round or annular ligament. 9. Insertion of the preceding ligament into the radius. 10 Insertion of the same ligament into the ulna.

FIG. 4. *Osseous System.* The Right parietal of a fœtus of seven months, seen from its external surface.

No 1, centre of the bone whence the osseous rays appear to emanate. 2 Superior edge, 3, Inferior edge. 4. Anterior edge. 5. Posterior edge of the bone.

FIG. 5. *Osseous System.* Superior extremity of the humerus, split longitudinally. The arteries and veins are injected, to show the disposition and distribution of the nutritious arteries of bones. The marrow has been in great part removed.

No 1. Section of the head of the bone and cartilaginous crust covering it. 2. Section of the great tuberosity. 3 Spongy texture filled with medullary fluid. 4, 4. Sections of the parietes of the medullary canal. 5. Portions of the deep-seated humeral veins and arteries. 6. Nutritious arteries and veins which rise from the preceding vessels and pass into the nutritious canal. 7. The same vessels entering the medullary canal. 8. Medullary canal and divisions, subdivisions and anatomoses of nutritious vessels.

FIG. 6. *Osseous System.* Longitudinal section of the femur of a man of 18, to show the epiphyses and cartilaginous layer which separates them from the body of the bone.

No. 1. Head of the bone. 2. The neck. 3. Cartilaginous layer which sepa-

rates the head from the neck. 4. The great trochanter. 5. Cartilaginous layer which unites the preceding epiphyses to 6. The body of the bone.

Fig. 7. *Elastic System.* One of the yellow ligaments which unite the laminæ of the vertebræ together, seen from the inside of the vertebral canal.

No. 1, 1. Lamina of the fifth and sixth dorsal vertebræ. 2. The yellow ligament inserted into the preceding laminæ. 3, 3, transverse processes; and 4, 4, Articular processes of the sixth dorsal vertebræ.

Fig. 8. *Cartilaginous System.* The cartilages of the larynx of a woman, with the two first rings of the trachea and os hyoides.

No. 1. The os hyoides. The epiglottic fibro-cartilage. 3. The thyroid cartilage. 4. The thyro-hyoidian fibro cartilage. 6. The crico-thyroidian fibrous membrane, which unites the cricoid and thyroid cartilages. 7, 7. The two first rings of the trachea-arteria. 8. Fibrous membrane which unites the two preceding rings with each other.

Fig. 9. *Fibro-Cartilaginous System.* One of the fibro-cartilages of the knee-joint.

No. 1, 1. Extremities. 2. External or thick edge. Internal or thin edge of the fibro-cartilage.

Fig. 10. *Cavernous System.* The penis detached from the rami of the ischium and divided obliquely through its superior surface to show the texture of the cavernous bodies, and the median partition which separates them.

No. 1. The gland. 2. Portion of the prepuce. 3, 3. Roots of the cavernous bodies. 4, 4. Section of the fibrous membrane of the cavernous bodies. 5. The cavernous texture. 6. The septum. 7. Flap of the cavernous bodies detached and reversed.

Fig. 11. *Corneous System.* Nail of a man's thumb seen from the external surface.

No. 1. Free extremity. 2. The root or adherent extremity; and 3, The body of the nail.

PLATE 3.

Fig. 1. Frontal bone of a man of 30 years. seen from its anterior or epicranial surface.

No. 1. Suture uniting the two pieces of which the bone is composed in early life. Most commonly this suture becomes obliterated, and no trace of it is left, except a slightly salient line. 2. Nasal protuberance. 3. Nasal groove. 4. Nasal spine. 5. Frontal or coronal protuberance. 6. Superciliary arch.

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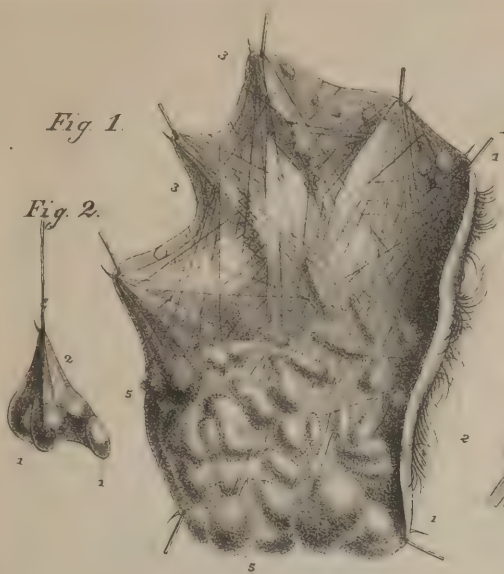

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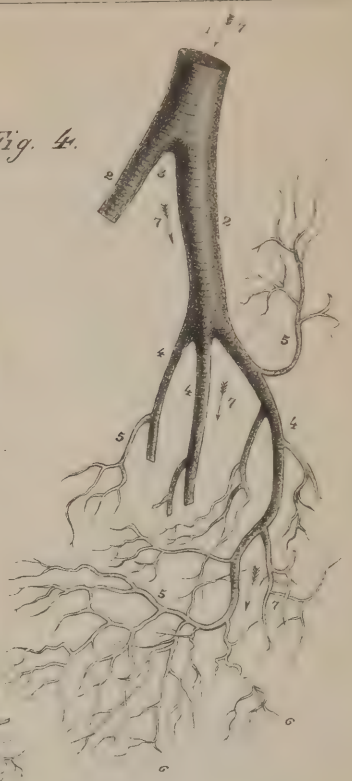

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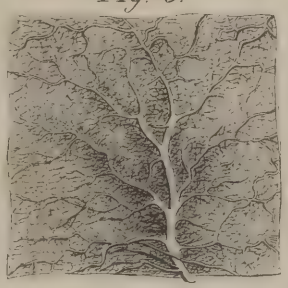

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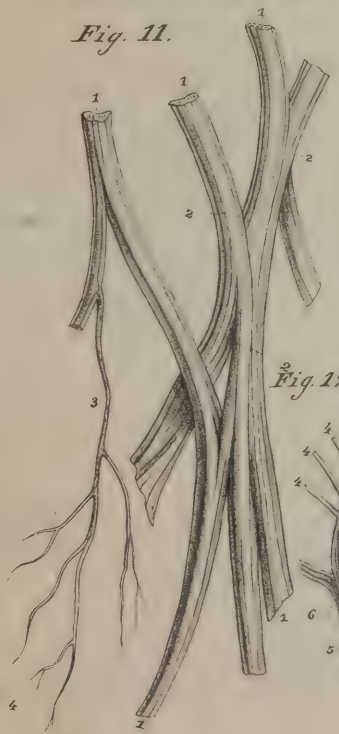

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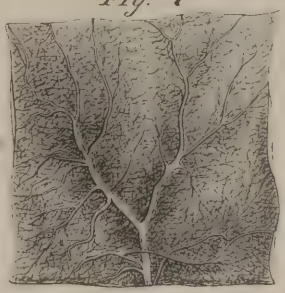

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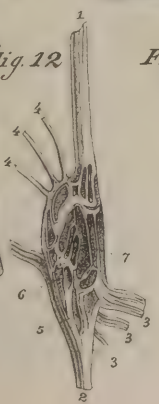

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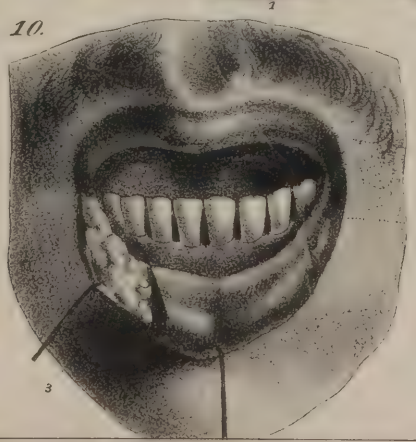

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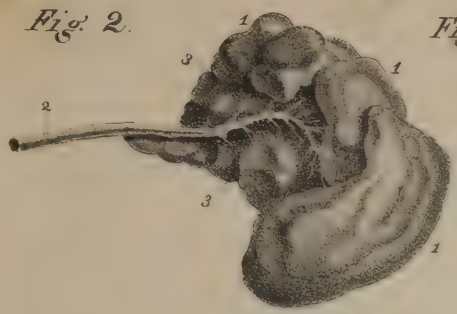

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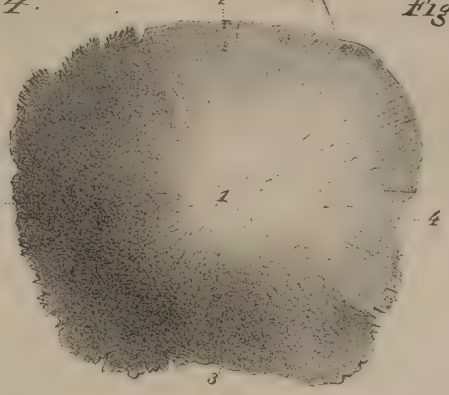

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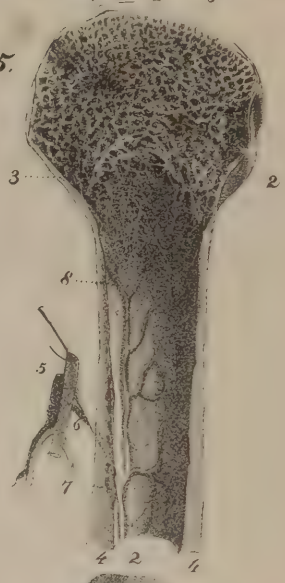

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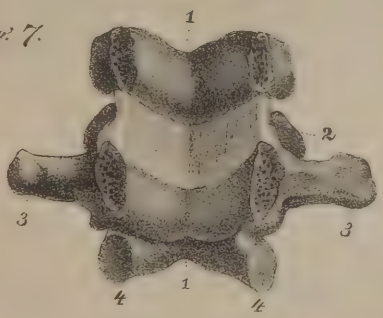

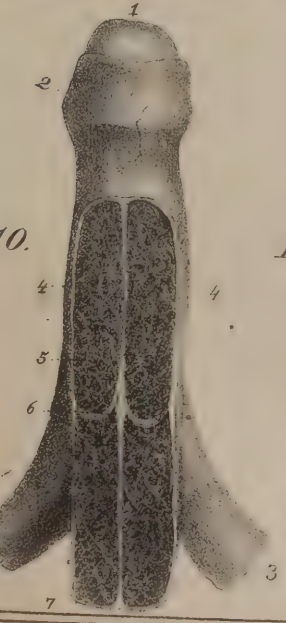

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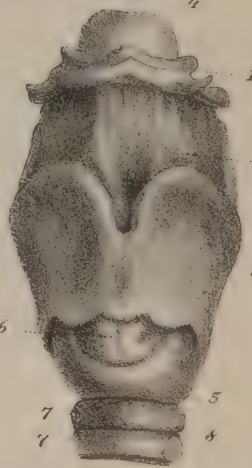

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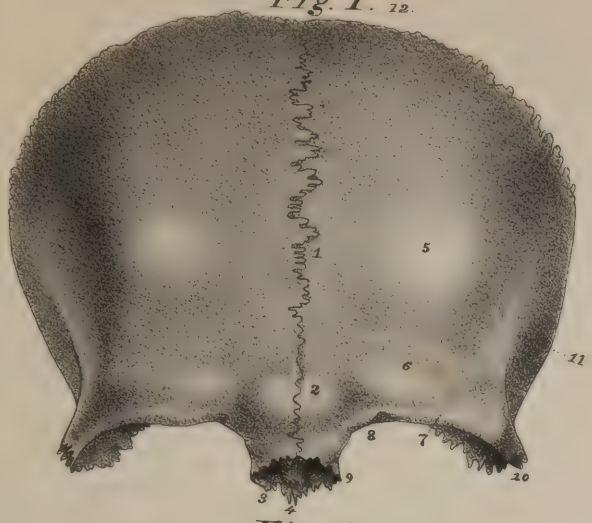

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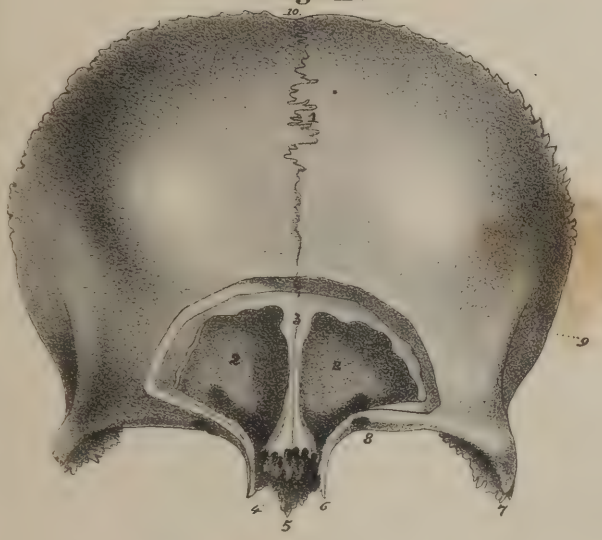

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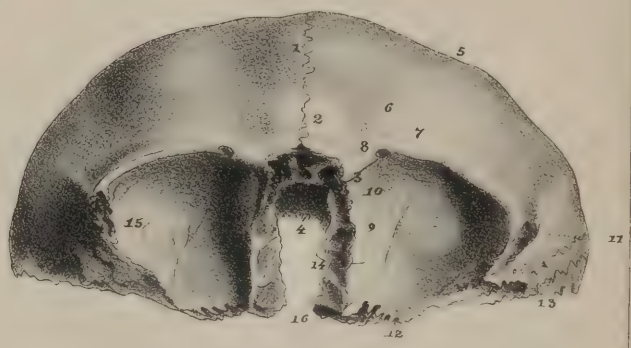

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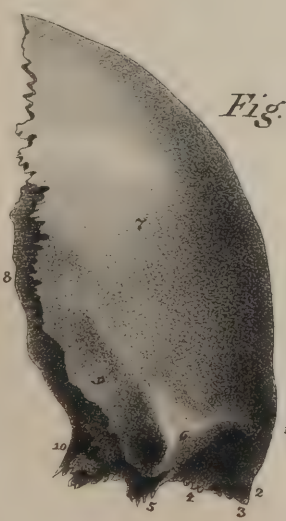

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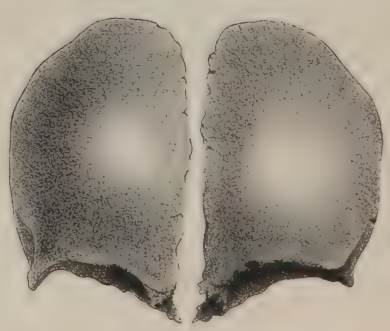

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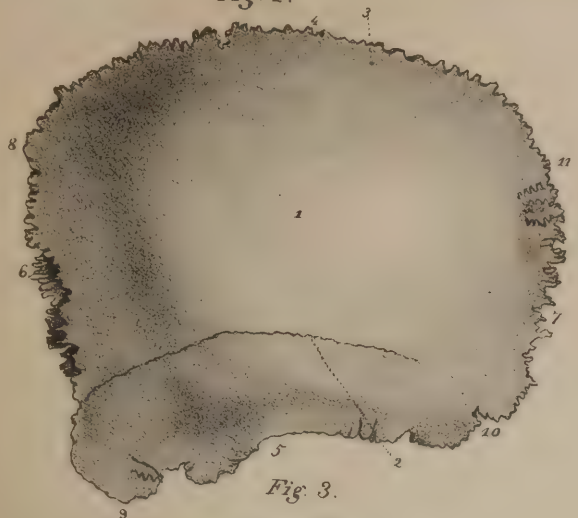

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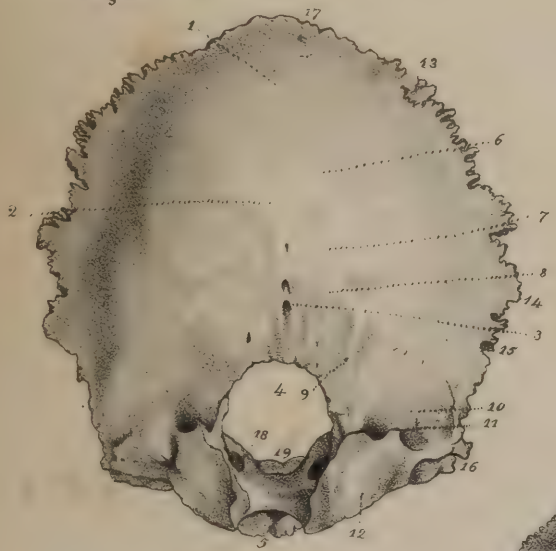

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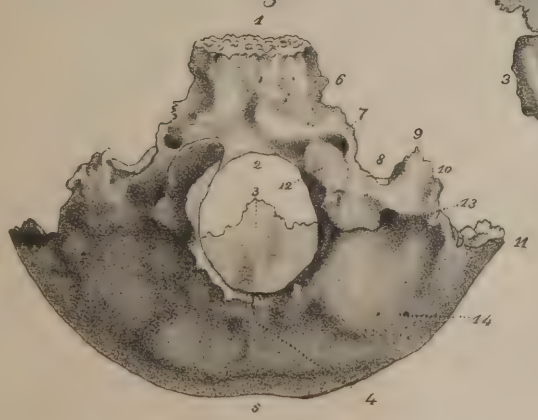

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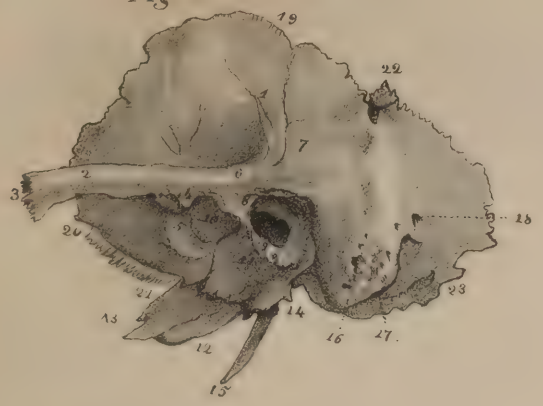

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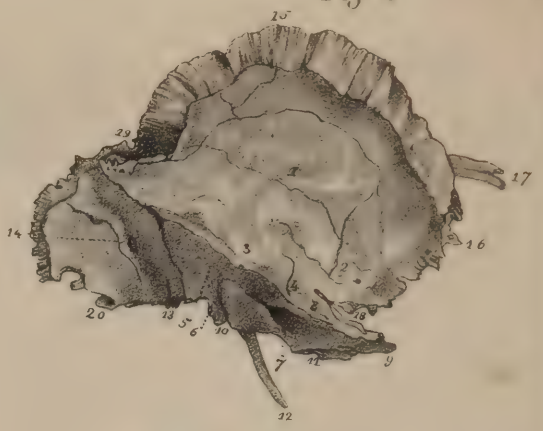

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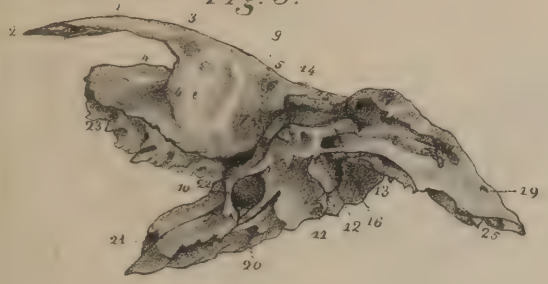

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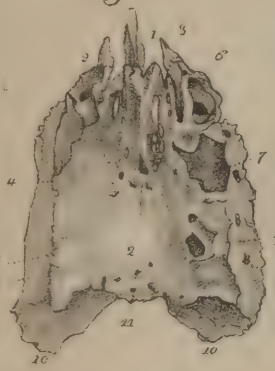


Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

Fig. 12.

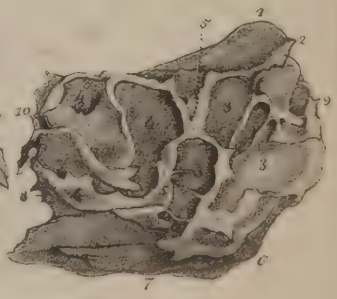


Fig. 13.

Fig. 1.

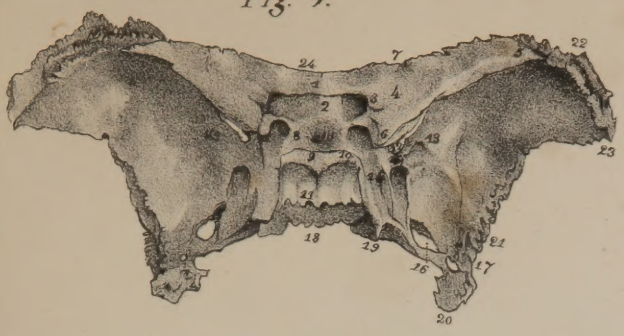


Fig. 2.

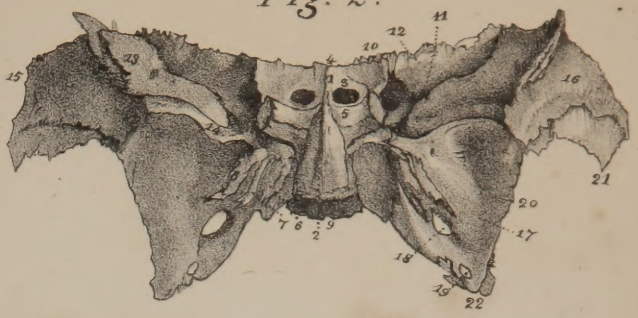


Fig. 3.

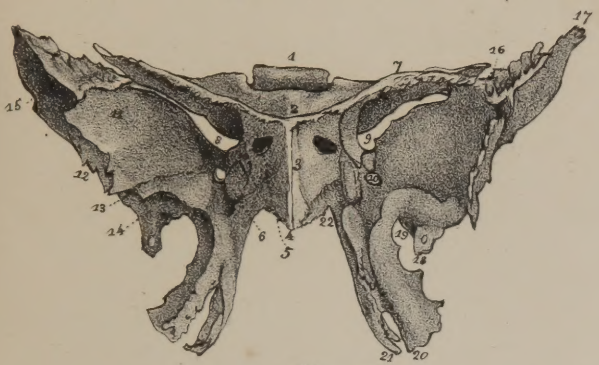


Fig. 4.

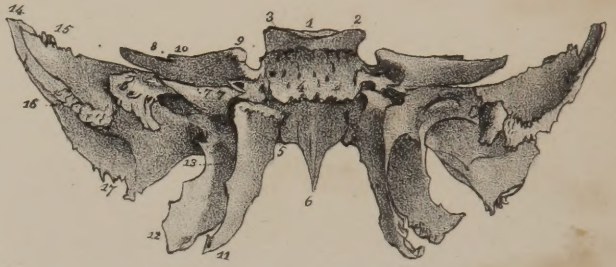


Fig. 5.

Fig. 6.

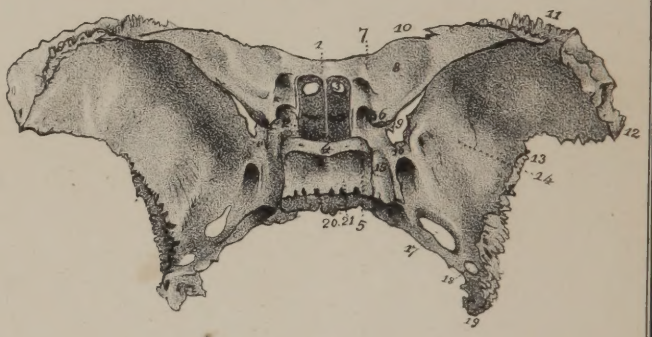


Fig. 7.

Fig. 8.

Fig. 9

Fig. 10.

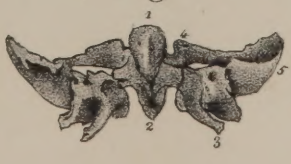
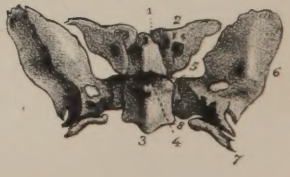


Fig. 11.



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